Lignite Fuel Enhancement

Quarterly Technical Progress Report:

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Disclaimer

Abstract

This 10th quarterly Technical Progress Report for the Lignite Fuel Enhancement Project summarizes activities from October 1st through December 31st of 2006. It summarizes the completion of the Prototype testing activity and initial full-scale dryer design, Budget Period 2, activity during that time period.

Acknowledgement

The authors wish to acknowledge the contributions and support provided by various project managers: Dr. Sai Gollakota (DOE), Matt Coughlin (North Engineering) Dave Rian (Barr), John Wheeldon (EPRI), Tony Armor (EPRI), Dr. Ed Levy (Lehigh), Dr. Nedad Saranac (Lehigh), and Mark Ness (GRE).

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Executive Report

Progress:

The Design Team continued conferencing this quarter. Primary focus for the team has been the full-scale design and layouts, dryer design specification, crusher system layouts, and air jig layout. Barr Engineers were out to Coal Creek several times to review locations, potential structural interferences, and work with GRE staff on final design nuances. By the end of December we had run nearly 250,000 tons of lignite through the dryer. The dryer was down for three weeks in December because a shear pin on a drive spocket on the dry coal conveying bucket elevator broke and the sprocket subsequently damaged the elevator. Disassembly, waiting for parts, and re-assembly took three weeks.

Lehigh University has completed the Budget Period 1 (Phase 1) final report. It is currently being reviewed by GRE personnel before being sent to the NETL. The summary is that the prototype system "met or exceeded expectations in terms of performance improvement, emissions reduction, operability, and positive affect on plant operation". The recommendation is to proceed with design, construction, and implementation on a commercial scale in Unit#2. And although a few minor problems were encountered it has operated continuously from the control room like any other piece of plant equipment. The problems have been with conveyance or dust collector fan power limits, not the dryer.

To further summarize, at 75 ton/hr or 14% of the total coal input, the performance goals were easily met. Heat rate, emissions, power savings, HHV, and moisture reduction values all lie on predicted curves. Even at 101 ton/hr the HHV was improved 14 to 21%. Mill 26 feeder trips have also been eliminated because of the dried coal. We did learn that heat input needs to be increased to meet goals at maximum (112.5 ton/hr) feed rate and the heat transfer area for the bed coils will be increased 14.75% as a result. Five separate coils configurations were tried in the prototype and the largest will accommodate this change. As an added factor of safety the team has put a 125 degree constraint on the temperature of the product coal; warmer coal than that may cause problems in the storage bunkers. Therefore a short (4 ft) cooling section will be added to the commercial dryers to accommodate this and accomplish some additional drying.

Great River Energy and Headwaters continue to meet to discuss the Commercialization Plan.

Invoices for BP2 have been slow to arrive this quarter and none were submitted. The Budget expended through August 31st was $10,425,202 (budget $10,856,518). DOE contribution was half and paid.

Charles Bullinger gave a presentation at the North American Coal Meeting in Dallas on December 4$^{th.}$. EPRI continues plans to "sunrise" a Dryer Interest Group but was deferred to early 2007 when GRE patents are projected to be finalized.

Problems Encountered:

Problem with bucket elevator drive sprocket shear pin and subsequent damage to elevator. Assembly, waiting for parts, and re-assembly took three weeks.

Plans for the next reporting period:

Some “life” data on coils, air locks, and dust collector corrosion potential collected as the dryer continues to run through the Winter. Budget Period 2 is well under way and final design of the full-scale System will be completed. Expect some material (heavy steel) and major components to begin arriving by the end of the quarter. Budget Period 1 Final Report will be forwarded to the NETL. Project Management Plan delivered and contracts for Barr, EPRI, and Lehigh will be delivered.

Prospects for future progress:

The prospects are quite good that all the next Quarter deliverables will be met.

Procurement for Budget Period 2 will continue and deliveries of some steel will arrive by next quarters end.

Experimental Apparatus:

Details of the dryer and system, P&ID's, schematics, and drawings contain "Limited Rights" information which cannot be disclosed at this particular time.

Experimental & Operating Data:

No "new" data to report. Data is being collected by the digital control system however no analysis has been done on it. The testing this quarter has been focused on "life" issues. Inspections will be continued this Winter to study those affects.

Data Reduction:

Nothing new to report this quarter.

Hypothesis & Conclusions:

Hypothesis remains the same. We will be able to dry lignite an increment to benefit the performance of and reduce emissions from a coal burning electric power generating station.